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<p>Website:</p> <p>www.e-tjo.org</p>
<p>DOI:</p> <p>10.4103/tjo.tjo_78_17</p>

Postoperative intraocular lens opacification

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Abstract:

Intraocular lens (IOL) opacification is rare but may occur after non-Descemet stripping automated endothelial keratoplasty (n-DSAEK) or intravitreal air injection after pars plana vitrectomy (PPV). We reported two cases of IOL opacification within the pupillary region. Chart was retrospectively reviewed. The predisposing factors and the visual acuity were analyzed. The opacification was evaluated by anterior segment optical coherence tomography (AS-OCT). A 68-year-old healthy woman with pseudophakic bullous keratopathy underwent uneventful n-DSAEK in the right eye. Postoperative vision was 20/40. Nine months after surgery, fine granular deposits were seen in the anterior surface of IOL. The vision decreased to 20/50 but remained stable during 3-year follow-up. A 61-year-old man with diabetes mellitus received PPV and silicone oil tamponade for retinal detachment and vitreal hemorrhage after cataract surgery in the right eye. Removal of silicone oil and intravitreal air injection was performed, and postoperative vision was 20/100. Granular deposits were observed in hydrophobic acrylic IOL 1 month after surgery. The visual acuity decreased to 20/120. AS-OCT revealed hyperreflective materials in the anterior surface of IOL in both cases. An uncommon phenomenon of IOL opacification in the pupil region may occur after n-DSAEK or PPV, which may be associated with intraocular air injection or systemic diseases.

Keywords:

Intraocular air injection, intraocular lens, non-Descemet stripping automated endothelial keratoplasty, opacification

Introduction

Intraocular lens (IOL) opacification has been observed with most materials.^[1] Its presentation may be various and the causes may be multifactorial. Descemet stripping automated endothelial keratoplasty (DSAEK) provides many advantages over traditional penetrating keratoplasty. However, an uncommon complication of IOL opacification after DSAEK was reported recently and could impair vision.^[2-5] This phenomenon may also occur in nonkeratoplasty cases such as filtration surgery for glaucoma and pars plana vitrectomy (PPV).^[6,7] Here, we reported two cases of opacification in the anterior surface of IOL limited to the pupillary area. One case underwent

non-DSAEK (n-DSAEK), and the other case received removal of silicone oil and intravitreal air injection.

Case Reports

Case 1

A 68-year-old woman was well healthy and underwent phacoemulsification and IOL implantation in the right eye at a local clinic in March 2012. Postoperative vision decreased, and she visited to our clinic 1 month later. Biomicroscopy revealed corneal edema with a vision of 20/200 in the right eye. Then, an uneventful n-DSAEK was smoothly performed in her right eye 4 months later. A donor corneoscleral button was mounted on an artificial anterior chamber and dissected with automated microkeratome (Moria, Inc, France). After 8-mm trephination, a thin lenticule was

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How to cite this article: Ma ST, Yang CM, Hou YC. Postoperative intraocular lens opacification. Taiwan J Ophthalmol 2018;8:49-51.

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Submission: 28-03-2017
Accepted: 14-07-2017

placed on Busin glide and pulled into anterior chamber by forceps, where it was unfolded and attached to the recipient cornea by air bubble for 10 min. The final air was left as the graft size at the end of surgery. Postoperatively, the lenticule was well attached to the cornea. Topical 0.1% betamethasone was prescribed four times daily and was tapered to twice daily 2 months later. Postoperative vision improved to 20/40. Nine months after surgery, a 3-mm circumscribed opacification was seen in the anterior surface of the IOL within the pupil region [Figure 1a]. The opacification was characterized by fine and white granular deposits. The vision of the right eye slightly decreased to 20/50. However, the opacification did not increase and her vision was 20/50 during the 3-year follow-up.

Case 2

A 61-year-old man with diabetes mellitus underwent uneventful phacoemulsification and implantation of IOL (AcrySof SA60AT; Alcon Surgery) in the right eye in December 2013. Later, he presented with proliferative diabetic retinopathy, retinal detachment, and vitreous hemorrhage with a vision of hand motion in the right eye. PPV and silicone oil tamponade were performed in November 2014. Postoperative course was smooth and vision was 20/120. Removal of silicone oil and intravitreal air injection was performed in March 2016, and postoperative vision was 20/100. However, whitish granular deposits were observed in the anterior surface of the IOL confined to the pupillary zone 1 month after surgery and vision decreased to 20/120 [Figure 1b]. The opacification and his vision were stationary in the 9-month follow-up.

Anterior segment optical coherence tomography (AS-OCT; Cirrus HD-OCT; Carl Zeiss Meditec Co. Ltd.; Tokyo, Japan) revealed hyperreflective opacity in the anterior surface of the IOLs in the two cases [Figure 2a and b].

Discussion

The opacification of the IOLs has been observed with some specific materials, or manufacturing or

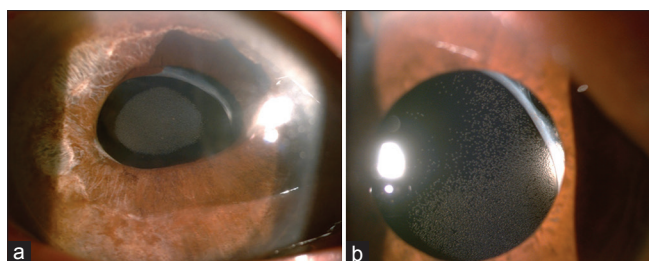


Figure 1: External eye photography. Fine granular deposits occurred in the anterior surface of the intraocular lens within the pupillary region 9 months after non-Descemet stripping automated endothelial keratoplasty in case 1 (a) and 1 month after intravitreal air injection in case 2 (b)

packaging process, including a snowflake opacification in polymethylmethacrylate IOLs, discoloration in silicone IOLs, calcification in hydrophilic acrylic IOLs, and microvacuoles (glistenings) in hydrophobic IOLs.^[8,9] IOL material and structure may have an impact on the affinity of calcification. Most severe cases of IOL opacification were associated with hydrophilic or hydrophilic-hydrophobic IOLs, while it could also be observed in hydrophobic IOL though relatively rare.^[10] The opacification may present in both anterior and posterior surface, deep central region, haptics, or nearly whole lens.^[1,6,11]

Since endothelial keratoplasty became popular surgery for corneal endothelial dysfunction, a rare complication of IOL opacification was observed. The opacification showed a particular presentation of numerous fine granular deposits in the anterior surface of IOL limited to the pupil zone, which could be demonstrated by Scheimpflug photography^[4,7] or AS-OCT. The major reported DSAEK cases were hydrophilic acrylic IOL, especially in those who experienced rebubbling.^[2-5] However, some of nonkeratoplasty cases with intravitreal injection of air or gas after PPV were also reported to have a similar pattern of IOL opacification.^[6,7] Case 2 showed the opacification could also occur in hydrophobic IOL, though his presentation was not the same as the previously reported cases. The duration between the onset of IOL calcification and surgery in most reported cases ranged from 1 month to 6 years.^[2-11] The deposits were mainly composed of calcium and phosphate, which were confirmed by special stains, scanning electron microscopy, and energy-dispersive x-ray spectroscopy.^[2-7]

The exact mechanism for IOL opacification still remains speculative and is believed to be multifactorial. Numerous potential risk factors have been proposed, such as

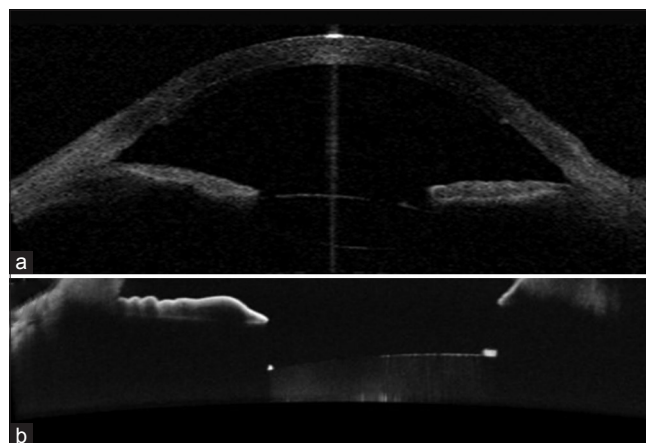


Figure 2: Anterior segment optical coherence tomography. In spite of the hyperreflective signal can be observed between different media in anterior segment optical coherence tomography image, the signal is more intense in the anterior surface of the Intraocular lens in the pupillary area, which indicated the area of material deposition in case 1(a) and case 2 (b)

hydrophilic acrylic IOL exposure to air, patient's general medical condition, or breakdown of the blood-aqueous barrier (BAB) during intraocular surgery, excessive postoperative ocular inflammation.^[2-5] Patients' systemic factors included renal failure and diabetes mellitus.^[10,11] The presence of intracameral air or gas contact with IOL surface may enhance subsequent crystallization under high concentration of calcium in the anterior chamber. Prolonged breakdown of the BAB may result in metabolic change of the microenvironment of the anterior chamber, including increase in protein, cells, and calcium content. Because the calcium deposits were inside the surface of the IOL and was hard to be removed by irrigation or polish, some cases may need IOL exchange.^[2-7]

Case 1 was only one case among 183 DSAEK or n-DSAEK cases in National Taiwan University Hospital from July 2009 to December 2016. There was no any known systemic factor or surgical complication contributed to the possible metabolic alteration in the aqueous in case 1. Her cataract surgery was performed elsewhere, so the implanted IOL material was unknown. Case 2 with diabetes mellitus had IOL opacification 1 month after intravitreal air injection. Both cases shared a similar situation of intraocular air injection, which might cause electrolytes imbalance and calcium deposits in the anterior surface of IOL. Other related factors, such as IOL materials, systemic diseases, or postoperative chronic inflammation, might also play a role in the development of their IOL calcification, especially in case 2. Because the vision impairment was relatively mild and remained stable in these 2 cases, their IOLs were not explanted. We could not confirm the true cause and material deposits in the opacification of the 2 patients, but calcium deposits were the most probable according to literature review. Surgeons should be aware of this uncommon phenomenon of IOL calcification and thoroughly investigated this condition by taking detailed medical and surgical history, the extent of vision impairment, the examination of AS-OCT and the serial records of IOL opacity, which could aid in avoidance of mismanagement such as the attempt of opacity removal by neodymium: Yttrium-aluminum-garnet laser or invalid surface polish of IOL by irrigation and aspiration. However, some severe cases may need IOL exchange.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has

given their consent for their images and other clinical information to be reported in the journal. The patient understands that name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

The authors declare that there are no conflicts of interests of this paper.

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